

## WHAT IS CLAIMED IS:

1. An electro discharge machining apparatus, comprising:
  - a first holder for holding a workpiece to be subjected to electro discharge machining;
  - an electrode provided opposing the workpiece held by the first holder;
  - a capacitor for supplying electric charge to the electrode and the workpiece so as to generate pulse electro discharge between the workpiece and the electrode;
  - a power source for applying a voltage to the capacitor;
  - a switching element provided between the capacitor, and at least one of the electrode, the workpiece and the power source;
  - a switch controller for controlling on and off of the switching element;
  - a current detecting element for detecting a current flowing between the workpiece and the electrode; and
  - a control unit for, based on the current detected by the current detecting element, judging whether or not a short circuit occurs between the workpiece and the electrode,  
wherein when it is judged that a short circuit occurs between the workpiece and the electrode, the switch controller switches off the switching element for a predetermined time.

2. An electro discharge machining apparatus according to claim 1, further comprising:

- a drive control unit for moving a position of the electrode,

- wherein when it is judged that a short circuit occurs

between the workpiece and the electrode, the drive control unit moves the position of the electrode so that a distance between the workpiece and the electrode is increased.

3. An electro discharge machining apparatus according to claim 1, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein the second holder is made of a low thermal expansive substance.

4. An electro discharge machining apparatus according to claim 3, wherein the coefficient of thermal expansion of the low thermal expansive substance is  $5 \times 10^{-6}$  or less.

5. An electro discharge machining apparatus according to claim 3, wherein the low thermal expansive substance is an invar alloy.

6. An electro discharge machining apparatus according to claim 1, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein an thermal isolator is equipped between the motor and the second holder.

7. An electro discharge machining apparatus according to claim 1, further comprising:

a motor for rotating the electrode; and

a second holder for holding the electrode,

wherein space is set between the motor and the second

holder.

8. An electro discharge machining apparatus, comprising:
  - a first holder for holding a workpiece to be subjected to electro discharge machining;
  - an electrode provided opposing the workpiece held by the first holder;
  - a capacitor for supplying electric charge to the electrode and the workpiece so as to generate pulse electro discharge between the workpiece and the electrode;
  - a power source for applying a voltage to the capacitor;
  - a switching element provided between the capacitor, and at least one of the electrode, the workpiece and the power source; and
  - a switch controller for controlling on and off of the switching element,  
wherein the switching element alternately is turned on and off so that duration of the pulse electro discharge is less than or equal to a predetermined time.

9. An electro discharge machining apparatus according to claim 8, wherein the predetermined time is a time from the beginning of the pulse electro discharge to the onset of electrolysis in one of the electrode and the workpiece.

10. An electro discharge machining apparatus according to claim 8, further comprising:
  - a motor for rotating the electrode; and
  - a second holder for holding the motor and the electrode,  
wherein the second holder is made of a low thermal expansive substance.

11. An electro discharge machining apparatus according to claim 10, wherein the coefficient of thermal expansion of the low thermal expansive substance is  $5 \times 10^{-6}$  or less.

12. An electro discharge machining apparatus according to claim 10, wherein the low thermal expansive substance is an invar alloy.

13. An electro discharge machining apparatus according to claim 8, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein an thermal isolator is equipped between the motor and the second holder.

14. An electro discharge machining apparatus according to claim 8, further comprising:

a motor for rotating the electrode; and

a second holder for holding the electrode,

wherein space is set between the motor and the second holder.

15. An electro discharge machining apparatus, comprising:

a first holder for holding a workpiece to be subjected to electro discharge machining;

an electrode provided opposing the workpiece held by the first holder;

a capacitor for supplying electric charge to the electrode and the workpiece so as to generate pulse electro discharge between the workpiece and the electrode;

a power source for applying a voltage to the

capacitor;

a current detecting element for detecting a current flowing between the workpiece and the electrode;

a control unit for, based on the current detected by the current detecting element, judging whether or not a period of the pulse electro discharge is less than or equal to a predetermined period; and

an adjuster for, when it is judged that the period of the pulse electro discharge is less than or equal to the predetermined period, adjusting an electric resistance value between the power source and the capacitor so that the period of the pulse electro discharge is greater than the predetermined period.

16. An electro discharge machining apparatus according to claim 15, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein the second holder is made of a low thermal expansive substance.

17. An electro discharge machining apparatus according to claim 16, wherein the coefficient of thermal expansion of the low thermal expansive substance is  $5 \times 10^{-6}$  or less.

18. An electro discharge machining apparatus according to claim 16, wherein the low thermal expansive substance is an invar alloy.

19. An electro discharge machining apparatus according to claim 15, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein an thermal isolator is equipped between the motor and the second holder.

20. An electro discharge machining apparatus according to claim 15, further comprising:

a motor for rotating the electrode; and

a second holder for holding the electrode,

wherein space is set between the motor and the second holder.

21. An electro discharge machining apparatus, comprising:

a first holder for holding a workpiece to be subjected to electro discharge machining;

an electrode provided opposing the workpiece held by the first holder;

a capacitor for supplying electric charge to the electrode and the workpiece so as to generate pulse electro discharge between the workpiece and the electrode;

a power source for applying a voltage to the capacitor;

a current detecting element for detecting a current flowing between the workpiece and the electrode;

a control unit for, based on the current detected by the current detecting element, judging whether or not a short circuit has occurred for a predetermined time between the workpiece and the electrode; and

an adjuster for, when it is judged that a short circuit has occurred for the predetermined time between the workpiece and the electrode, adjusting an electric resistance value between the power source and the capacitor so that a period of the pulse electro discharge is elongated.

22. An electro discharge machining apparatus according to claim 21, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein the second holder is made of a low thermal expansive substance.

23. An electro discharge machining apparatus according to claim 22, wherein the coefficient of thermal expansion of the low thermal expansive substance is  $5 \times 10^{-6}$  or less.

24. An electro discharge machining apparatus according to claim 22, wherein the low thermal expansive substance is an invar alloy.

25. An electro discharge machining apparatus according to claim 21, further comprising:

a motor for rotating the electrode; and

a second holder for holding the motor and the electrode,

wherein an thermal isolator is equipped between the motor and the second holder.

26. An electro discharge machining apparatus according to claim 21, further comprising:

a motor for rotating the electrode; and

a second holder for holding the electrode,

wherein space is set between the motor and the second holder.